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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,900	02/10/2006	Hidetaka Kojima	3273-0219PUS1	2123

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EXAMINER
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LAO, MARIALOUIA

ART UNIT	PAPER NUMBER
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1621

NOTIFICATION DATE	DELIVERY MODE
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05/15/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/567,900	<b>Applicant(s)</b> KOJIMA ET AL.	
	<b>Examiner</b> LOUISA LAO	<b>Art Unit</b> 1621	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 March 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments, filed 3/18/08, with respect to issues under 35 U.S.C. 103(a) have been fully considered and are persuasive. Applicants' arguments are persuasive, since the cited prior art references, albeit drawn to making acids, employ related but different catalyst systems. The rejection of claims 1-10 has been withdrawn.

However, upon further consideration, a new ground(s) of rejection is made, see below.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosono et al. (US 20060281944, US'944 *equivalent to JP2004277297*) in view of Scates et al. (US6303813, US'813 *equivalent to JP2003508363*) or Jones (US7098363, US'363 *equivalent to*

*JP2002508759) all in IDS and ISR, further in view of and Miura et al. (EP0687662, EP'662 equivalent to US5625095 in ISR).*

4. The instant claims are drawn to a method for producing acetic acid, comprising, *inter alia*, continuously reacting methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt, methyl iodide, methyl acetate, and water; with the following method characteristics, which are, *inter alia*, a production rate of 11 mol/L.hr or more; the acetaldehyde content kept to 500 ppm or less, carbon monoxide partial pressure of 1.05 MPa or more, methyl acetate of reaction mixture of 2 percent by weight or more, production rate of acetaldehyde to production rate of acetic acid at 1/1500 or less, hydrogen partial pressure, *inter alia*, at 100kPa or less, water content of the reaction mixture of 3% by weight or less.

5. US'944 in [0012] teaches a method of making acetic acid by carbonylating methanol with CO by way of a heterogeneous catalytic reaction in a bubble column reactor. In the claims pp10-12, US'944 teaches that the CO partial pressure within the range of 1.0-2.5 MPa or preferably 1.7-2.2 Mpa; where acetic acid productivity decreases when the CO partial pressure is below 1.0 MPa. And in Table 1 page 9 and in the examples, CO partial pressure was run at 1.8mPa. In the claims, US'944 teaches the concentration of water.

6. US'944 differs from the instant claims in US'944 being silent regarding a) the methyl acetate content of the reaction mixture; b) the concentration of acetaldehyde.

7. For difference (a), US'813 is relied upon to teach that the concentration of methyl acetate to be 0.5-5.0 wt%, as well as the optimum water level and hydrogen partial pressure, in the carbonylation reaction mixture for stabilization and rate enhancement purposes (see Table I col6, Table II col9 and col6 lines 18-60).

8. US`363 is relied upon to teach the advantage of faster reaction rate for carboxylic acid production having methyl acetate concentrations of 20 wt% relative to 10wt% (see examples col6-8, particularly col7 lines10-15).

9. The difference (a) would have been obvious to one of ordinary skill in the art at the time of Applicants' invention, since methyl acetate is a by-product of the reaction.

10. The artisan would have been motivated to optimize the level of methyl acetate concentration, since the cited prior art has shown the stabilization effect and rate enhancement effect of methyl acetate concentration in the carbonylation reaction to make acetic acid; and the artisan would have reached a reasonable expectation of making acetic acid with the desired purity following the optimal concentrations found effective in his art.

11. For difference (b), the amount of acetaldehyde, EP`662 is relied upon to teach in page 20 claims 1-2, a process of producing a high purity acetic acid, comprising continuously reacting methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt, and methyl iodide, wherein the reaction is carried out while maintaining *an acetaldehyde concentration* in the reaction liquid at 400 ppm or lower. In page 4 lines 37-39, EP`662 states that the water content is preferably 1 to 5 weight %. In page 4 lines 45-46, EP`662 states the partial pressure of carbon monoxide is preferably 4 to 15 atm. In lines 53-57 page 3, EP`662 discusses that the resulting reaction liquid of methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt and methyl iodide is *separated* from the low volatile phase containing the rhodium catalyst, *distilling* the volatile phase to obtain a product mixture containing acetic acid and the overhead containing methyl acetate and methyl iodide, and *recirculating* said overhead into the reactor, wherein the overhead contains acetaldehyde and iodide. In page 2 lines 49-51,

EP'662 discusses that the *ion-exchange resin* for treating the acetic acid is the partially converted *silver* form of a macro-reticulated strong acid cation exchange resin.

12. The remaining difference of acetaldehyde concentration is not patentable. It is not patentable because at the time of Applicants' invention was made, it would have been obvious to a person of ordinary skill in the art to utilize the process steps of US'944 with US'813 or US'363 since the carbonylation process of US'944 has the equivalent components of acetic acid, water, methyl acetate and methyl iodide, and catalyst system, inclusive of undesirable PRC's and other impurities.

13. One having ordinary skill in the art would have been motivated utilize the process steps of US'944 coupled with the other cited references since the carbonylation reactions to make acetic acid is improved when the CO partial pressure and methyl acetate concentration are within the instant ranges; and since the reaction conditions are equivalent, one of ordinary skill in the art can infer that the acetic acid reaction speed and concentrations are similar. The combination of the teachings of the cited prior art references show the components are separated efficaciously with an increased STY (space time yield) with impurities kept to the minimum, in the carbonylation process for the production of acetic acid and the artisan in optimizing his processes within the normal routine of adapting processes that work effectively, would expect a reasonable expectation of producing acetic acid with low acetaldehyde levels.

In applying known technique, such as optimizing CO partial pressure and/or methyl acetate content, to a known device (method, or product) ready for improvement to yield predictable results, the claim would have been obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art.

The claim would have been obvious because "a person of ordinary skill has a good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product, not of innovation, but of ordinary skill and common sense.

14. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable as being unpatentable over Hosono et al. (US 20060281944, US`944 *equivalent to JP2004277297*) in view of Scates et al. (US6303813, US`813 *equivalent to JP2003508363*) or Jones (US7098363, US`363 *equivalent to JP2002508759*) *all in IDS and ISR*, further in view of and Miura et al. (EP0687662, EP`662 *equivalent to US5625095 in ISR*), as applied to claims 1-7 above, and further in view of Cheung et al. (US7005541, US`541)

15. Claims 1-8 are rejected in view of the cited prior art references cited as set forth above, and are included herein in their entirety.

16. The instant claims are drawn to a method for producing acetic acid, comprising, *inter alia*, continuously reacting methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt, methyl iodide, methyl acetate, and water; with the following method characteristics, which are, *inter alia*, a production rate of 11 mol/L.hr or more; the acetaldehyde content kept to 500 ppm or less, carbon monoxide partial pressure of 1.05 MPa or more, methyl acetate of reaction mixture of 2 percent by weight or more, production rate of acetaldehyde to production rate of acetic acid at 1/1500 or less, hydrogen partial pressure, *inter alia*, at 100kPa or less, water content of the reaction mixture of 3% by weight or less. The instant claims include a purification process. The said purification step comprises the separation of the target acetic acid compound from the reaction by-products, treating the acetic acid with a silver- or mercury-exchanged [*sic*] resin, as well as the recovery and recycling of catalyst system and reactants reusable to augment virgin materials.

17. US`541, in column 6 lines 1- 67 continuing to columns 7-8 lines 1 68, teaches that in the carbonylation reaction to form acetic acid, the reaction mixture of methanol and carbon

monoxide is continuously fed to a reactor in which desired partial pressure of carbon monoxide is maintained, the accumulation and level of impurities or PRC's (permanganate reducing components, like acetaldehyde) are kept to a minimum; whereby the reaction mixture is separated into product acetic acid and lighter components of reaction mixture, the latter containing mostly acetic acid and catalyst may be recycled back to the reactor. Vapors from the flasher are fed to a splitter, where overhead vapors are condensed and separated into light aqueous phase and a heavy organic phase. The light aqueous phase contains water, acetic acid, methanol, methyl iodide and methyl acetate and some PRC's. The heavy organic phase contains mainly methyl iodide and methyl acetate, which may be recycled as is or after further processing. The light aqueous phase is typically used as reflux and a *portion recycled back to the reaction section*, where typically a first distillation column serves to separate the fraction of a lighter overhead comprising acetaldehyde, methyl iodide and methyl acetate from the heavier fraction comprising acetic acid and water which is *recycled to the purification section*. In lines 41-68 column 7, US'541 delineates the steps and components thereto, comprising *volatile and low-volatile components separated by at least two distillation steps, the volatile component comprising acetic acid, water, methyl acetate and methyl iodide, and the low-volatile component comprising the catalyst system and the PRC's (carbonyl impurities)* by step-wise illustration of the figure therein inclusive of the *distillation columns* and reference to *further processing steps*. US'541 teaches the acetic production rates of 15 g-mol/l/hr of less than 2.0% water, using rhodium or rhodium/iridium catalysts with methyl acetate (column 4 lines 48-53); where the methyl acetate levels are 1.0-30% (column 6 lines 18-23). US'541 teaches the continuous



carbonylation process to comprise reaction, purification, and off-gas treatment sections (column 7 lines 41-43).

18. It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to further utilize a purification process to optimize the quality of the desired end product, including the recycle and reuse of unreacted materials.

19. The artisan would have been motivated to optimize the purity of his end-product, for quality purposes and recycle/reuse unreacted materials to defray capital costs and reach a reasonable expectation of making the desired acetic acid with excellent purity.

20. The combination of the teachings of the cited prior art references are fairly suggestive of the *prima facie* obviousness of the instant claims, as recited.

21. No claims are allowed.

### ***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LOUISA LAO whose telephone number is (571)272-9930. The examiner can normally be reached on Mondays to Thursdays from 8:00am to 8:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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